

Remarks

Reconsideration and allowance of the subject application are respectfully solicited.

Claims 1-30 remain pending in the application, with Claims 1, 23, 24, 28 and 30 being independent. Claims 4, 24 and 30 have been amended herein.

Applicants note with appreciation the indication that Claim 27 recites allowable subject matter. This claim was objected to for being dependent upon a rejected base claim. However, this claim will not be rewritten in independent form at this time because its independent claim is believed to be allowable for the reasons discussed below.

Claims 1-3, 8-16, 18-23 and 28-30 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,254,217 (Askeland et al.). Claim 17 was rejected under 35 U.S.C. § 103 as being unpatentable over Askeland et al. in view of U.S. Patent No. 4,593,295 (Matsufuji et al.). Claims 4-7 and 24-26 were rejected under § 103 as being unpatentable over Askeland et al. in view of U.S. Patent No. 5,907,332 (Fujita et al.). These rejections are respectfully traversed.

The present invention is clearly distinguished from the citations of record. The present invention, in many claims, is directed to making the order of ink applications in a certain pixel area different from the order of ink applications in another pixel area. Such a feature is not described in the cited documents. For example, Askeland et al. describes using a mask pattern and determining the order of ink application in each pixel in the pattern, but does not disclose changing the order of ink applications. Further, although Askeland et al. controls a plurality of same color ink droplets to be applied to one pixel,

there is no disclosure of controlling the ink quantity of each ink ejection. These distinctions will be discussed in detail below.

As discussed previously, Askeland et al. can reduce hue shift due to differing deposition orders of different color ink drops in bi-directional printing. A mask pattern is used and the printing of pixels in forward and reverse scans are controlled. One pixel is printed by 1-3 droplets of the ink. Figs. 8A-8C depict mask patterns for forward scanning and rearward scanning, with the patterns being different for different colors. Applicants submit that from this example, it is understood that the number of ink droplets to be applied to each of the pixels in the forward and rearward scans is determined by the mask.

Figs. 11A-11C of Askeland et al. describe the stacking or drop order when the mask patterns of Figs. 8A-8C are used. In the example of Fig. 11A, dark blue is printed all over the recording surface. When the whole surface is to be printed in a predetermined color, the cells in which the orders of the ink application are different are dispersed in the pattern. However, Applicants submit that in actual printing, no printing may be effected for certain pixels and if such a dot pattern is synchronous with the mask pattern, the pixels which are printed with the same order of ink applications are concentrated, with result of the image being biased to a certain hue.

That is, the intended order of the ink applications for each pixel in Askeland et al. is determined by the mask pattern corresponding to forward or reverse scanning, but the order of the actual ink application is determined by image data corresponding to the pixel. When exactly the same data are applied to respective pixels, the orders of ink

applications are different between a certain pixel and another pixel in the mask pattern.

The order of ink overlapping is repeated for each of the sizes of the mask pattern.

According to Applicants, what results is that at most the pixels in which the orders of the ink overlapping are different are provided within the size of the mask pattern. In other words, the orders of ink applications are determined by the mask pattern.

This differs from the present invention in which the order of ink applications is changed depending on the pixel areas. In Askeland et al., the order of ink applications for each pixel is predetermined by the mask. If the image data is synchronous with the mask pattern, the ink applications will inevitably be the same.

Moreover, with the present invention, the amount of ink is controlled by unit application of the ink. The order of application of the ink can be changed for the different color inks with at least one amount. Such is not disclosed in Askeland et al.

Accordingly, Askeland et al. fails to disclose or suggest controlling a number of ink droplets of each color applied to each pixel area and an amount of the ink applied by unit application of the ink, changing an order of applications of the inks of different colors to be applied at least at one amount for printing the secondary color to a secondary color pixel area, and forming the secondary color while making the order of applications of the inks to at least one of a plurality of secondary color pixels areas arranged along a predetermined direction different from the order of another, as is recited in independent Claim 1.

Askeland et al. also fails to disclose or suggest controlling an amount of ink applied by a unit application in accordance with multi-level data corresponding to a pixel

area, changing an order of applications of inks of different colors to be applied at least at one amount to form a process color in a process color pixel area, and forming the process color by making an order of applications of the inks to at least one of the process color pixel areas arranged in a raster direction different from the order of another, as is recited in independent Claim 23.

Askeland et al. also does not disclose or suggest that a number of ink droplets of each color applied to each pixel area and an amount of the ink applied by a unit application of the ink are controlled in accordance with multi-level data, with applying ink of a certain color at least at one amount to form a secondary color and applying different color inks to form the secondary color in the secondary color pixel area in an order of applications which is different from the first order, as is recited in independent Claim 28.

Nor does Askeland et al. describe a print having a color image provided by different colors inks and applied in a form of different amounts of droplets, with a plurality of pixel areas being printed by different color inks at least at one amount, and an order of applications of the inks to at least one of the pixel areas is different from the order of another, as is recited in independent Claim 30.

The Office Action refers to col. 3, lines 28-31 of Askeland et al. to suggest a recording head having recording elements corresponding to different color inks arranged symmetrically in a scanning direction. However, this background section of Askeland et al. is describing a known method for solving the problem of hue difference in bi-directional printing, in which in the printing head structure the arrangement of the colors is symmetrical. However, the heads are selectively used in forward and reverse scanning

such that the order of ink applications is the same in both forward and reverse scanning. There is no disclosure or suggestion of changing the order of applications of the inks.

Askeland et al. is not believed to disclose or suggest a printing apparatus that effects scanning of a recording head having recording elements corresponding to different color inks arranged symmetrically and applying the color inks of different amounts, with the apparatus including means for distributing print data for a color to be printed to at least one of plural print buffers on the basis of an image signal, and means for effecting printing by actuating the recording elements corresponding to respective print buffers in accordance with print data stored in the respective print buffers, as is recited in independent Claim 24.

Thus, Askeland et al. fails to disclose or suggest important features of the present invention recited in the independent claims.

Matsufuji et al. relates to an ink jet recording device in which groups of recording elements are arranged at shifted pitches. In Matsufuji et al., the orders of ink applications may be different, but the positions at which droplets are ejected are different as shown in Fig. 5. Matsufuji et al. fails to remedy the deficiencies of Askeland et al. noted above with respect to the independent claims.

The ink jet recording apparatus of Fujita et al. includes an image processor and four buffers for temporarily storing color data. However, Fujita et al. is also not believed to remedy the deficiencies of the citations noted above with respect to the independent claims.

Thus, independent Claims 1, 23, 24, 28 and 30 are patentable over the citations of record. Reconsideration and withdrawal of the §§ 102 and 103 rejections are respectfully requested.


For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1, 23, 24, 28 and 30. Dependent Claims 2-22, 25-27 and 29 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.

This Amendment After Final Rejection is an earnest attempt to advance prosecution and reduce the number of issues, and is believed to clearly place this application in condition for allowance. This Amendment was not earlier presented because Applicants earnestly believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of this Amendment under 37 CFR 1.116 is respectfully requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,


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